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Perioperative Anesthesia Abstracts

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Adherence to, and barriers and facilitators of, prehabilitation for adult surgical patients: a systematic review

Submission ID

57

AUTHORS

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INTRODUCTION

Prehabilitation is a uni- or multimodal intervention that aims to increase patients' reserves before surgery to improve postoperative recovery. Low certainty evidence suggests that prehabilitation interventions may improve outcomes,[1] but a key barrier to prehabilitation effectiveness is poor intervention adherence. In fact, several recent low risk of bias trials show large benefits from prehabilitation in adherent participants, but no impact across all participants because of low adherence.[2–4] While some reviews have identified predictors of, and barriers and facilitators to, exercise adherence, data specific to prehabilitation and multicomponent (e.g., exercise, nutrition, psychocognitive) interventions are lacking. Therefore, we undertook a systematic review: 1) to estimate prehabilitation adherence overall and by intervention component, 2) to describe how adherence is measured, 3) to identify predictors of adherence, and 4) to identify barriers and facilitators to adherence as reported in randomized trials of prehabilitation in adult surgical patients.

METHODS

Ethical review was not required for this prespecified substudy of a larger review focused on comparative efficacy of prehabilitation components. Our protocol was directly informed using integrated knowledge translation methods that engaged diverse partners. Best practices were used for duplicate title/abstract and full text review, applied using a peer-reviewed search strategy in seven biomedical databases without language restrictions (inception to February 2023). Studies of adult, surgical patients participants randomized to a prehabilitation program for ≥ 7 days before elective surgery and that reported a measure of adherence were included. Data were extracted in duplicate from included studies, and authors were contacted to recover missing data. Adherence was extracted as reported (continuous measure of proportion of prehabilitation completed, or as a binary indicator of meeting a certain threshold of participation).

Descriptive statistics of included studies, measures of adherence, and median [interquartile range (IQR)] for adherence were calculated across all studies and for each prehabilitation component. Barriers and facilitators to adherence were identified with supporting text, and were inductively coded into themes by two authors. Themes were deductively organized per the Theoretical Domains Framework (TDF). An ongoing meta-regression analysis will estimate the association of pre-specified patient, procedural and program features with adherence.

RESULTS

We screened 5,498 titles and included 106 studies (*n* = 4,640), 43% underwent general, 23% orthopedic, and 19% thoracic surgery. Median adherence as a proportion of prehabilitation completed was 92% [IQR, 82–97] and 83% [IQR, 64–92] using threshold definitions. Nutritional adherence was 89% [IQR, 79–94] and exercise was 76% [IQR, 58–90]. Definitions used to measure adherence were heterogeneous.

We identified four barrier themes: 1) Health conditions (acute and chronic medical issues, gastrointestinal intolerance); 2) Personal factors (anxiety, time constraints, competing commitments); 3) Social influences (lack of social support, social roles); and 4) Logistical issues (lack of access to transport, supervision, supplements and information technology).

Six facilitator themes included: 1) Supervision (by physiotherapist/dietician); 2) Home-based training; 3) Personalization (individualized program, variety); 4) Access to resources (program materials, equipment, supplements and information technology); 5) Supporting program engagement (coaching, motivation); and 6) Presence of social support (training with relatives/support person) (TDF domains, Table).

DISCUSSION

Prehabilitation adherence is variable across trials, as are metrics used to quantify adherence. To improve reporting and interpretation of prehabilitation evidence, the field should establish common metrics and approaches to adherence measurement. To increase prehabilitation efficacy through improved adherence, TDF-informed barriers and facilitators identified in our review could be linked to evidence-based strategies using the related Behaviour Change Matrix (e.g., use of incentives and self-monitoring to overcome Beliefs about capabilities.[5] Promisingly, many factors identified as barriers had their counter condition identified as a facilitator (e.g., lack of supervision as barrier, presence of supervision as facilitator).

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Table

Theme	Example (s)	TDF Domain (s)
Barriers		
Health conditions	Acute and chronic medical issues, gastrointestinal intolerance	Beliefs about capabilities
Personal factors	Anxiety, time constraints, competing commitments	Emotion, Goals, Behavioural regulation
Social influences	Lack of social support, social roles	Social influences, Social role and identity
Logistical issues	Lack of access to transport, training supervision, supplements and information technology	Environmental context and resources, Reinforcement
Facilitators		
Supervision by specialists	Partially/fully supervision by physiotherapist/dietitian following individual progression	Behavioural regulations, Environmental context and resources
Home-based training		Environmental context and resources
Personalization	Tailored training/nutrition to patient and home environment, variety in nutrition	Behavioural regulation
Adequate access to supplements/equipment	Training booklet, videos, pedometer, step-trainer, heart rate monitor, jug, shaker bottle, mobile software application	Environmental context and resources
Supporting and reinforcing program engagement	Coaching, motivation techniques	Beliefs about capabilities, Beliefs about consequences, Optimism, Goals, Reinforcement
Presence of social support	Training with relatives/support person	Social influences, Reinforcement

Assessing the Fragility Index of randomized controlled trials supporting perioperative care guidelines: preliminary results of a methodological survey

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76

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INTRODUCTION

The Fragility Index (FI) and the Reverse Fragility Index (rFI) indicate the number of events needed to change and revert the study's statistical significance.[1] Robustness analysis evaluates how minor changes impact outcomes in Randomized Controlled Trials (RCTs), offering valuable insights into the stability and susceptibility to manipulation or misinterpretation of statistically insignificant results.[3]

Limitations in conducting RCTs in perioperative medicine, including nonstatistically significant results and susceptibility to spin bias, have spurred comprehensive research methods for better study comparisons.[3] Using fragility assessment as a complementary measure to determine study stability has been proposed as a potential solution.[4]

This study surveyed Clinical Practice Guidelines (CPGs) from the North American and European Societies of Anesthesiology published in the last ten years to determine their FI/rFI and explore trial characteristics associated with fragility.

METHODS

Randomized controlled trials supporting CPGs from the American and European Societies of Anesthesia were systematically surveyed. The updated protocol is registered with the OSF registries (Registration DOI: 10.17605/OSF.IO/8KBPE). Our report follows Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for methodological investigations.[5]

Perioperative CPGs created between January 2012 and December 2022 by the European and North American Societies of Anesthesia were identified. All documents clearly designated

as “guidelines” were included, while pain management and critical care evidence-based guidelines, practice advisories, consensus statements, and less recent guideline iterations were excluded.

To find all human clinical trials mentioned in each guideline, we surveyed chosen CPGs. Fragility analysis used only two-parallel-arm or two-by-two factorial trials with a 1:1 allocation ratio, assessing a binary outcome.

The Fragility Index will be computed using a random sample of 200 RCTs meeting eligibility criteria, stratified by recommended categories (general, regional, obstetric, pediatric, neuro-anesthesia, and cardiovascular).

Data from the included guidelines were collected separately by six team members. Reviewers compared results, settling conflicts by consensus. If the guidelines targeted a multidisciplinary audience, the total recommendations were counted, but for FI analysis, only those for anesthesiologists were considered.

RESULTS

Of the 2,934 references found, 64 guidelines were used in the analysis. The Figure displays the PRISMA Flowchart.

ERAS guidelines accounted for 39% (*n* = 25), Task Force and Working Group guidelines for 36% (*n* = 23), and CPGs for 33% (*n* = 21). Forty-eight percent (*n* = 31) used the GRADE System for classifying evidence quality, 39% (*n* = 25) used a society-based method, 9% (*n* = 6) used the ACC/AHA Classification System, and 3% (*n* = 2) did not report the classification system used.

Seventy-four percent (*n* = 1.841) of the 2,476 recommendations relate to general anesthesia care. The studies' quality was: 34% low (*n* = 835), 22% intermediate (*n* = 550), 19% high (*n* = 482), and 25% unknown (*n* = 609).

The 1,918 RCTs obtained from the survey are being evaluated for eligibility; of these, approximately 30% have satisfied the inclusion criteria for FI/rFI assessment.

DISCUSSION

Methodological differences exist in evaluating evidence levels across guidelines; 48% use the GRADE system, and 39% employ adaptations of various grading systems. These adaptations combine ACC/AHA, GRADE, and the Oxford Centre for Evidence-Based Medicine, incorporating separate categories for expert opinion-based recommendations. Our results align with Laserna *et al*.[5] Notably, 609 of 2,476 recommendations omit quality reporting.

While guideline quality was not assessed, the widespread under-reporting aligns with concerns raised in prior studies. Preliminary findings stress the need for standardized CPG methodologies to enhance research reliability. FI/rFI assessments will shed light on anesthetic trial strength and potential fragility factors.

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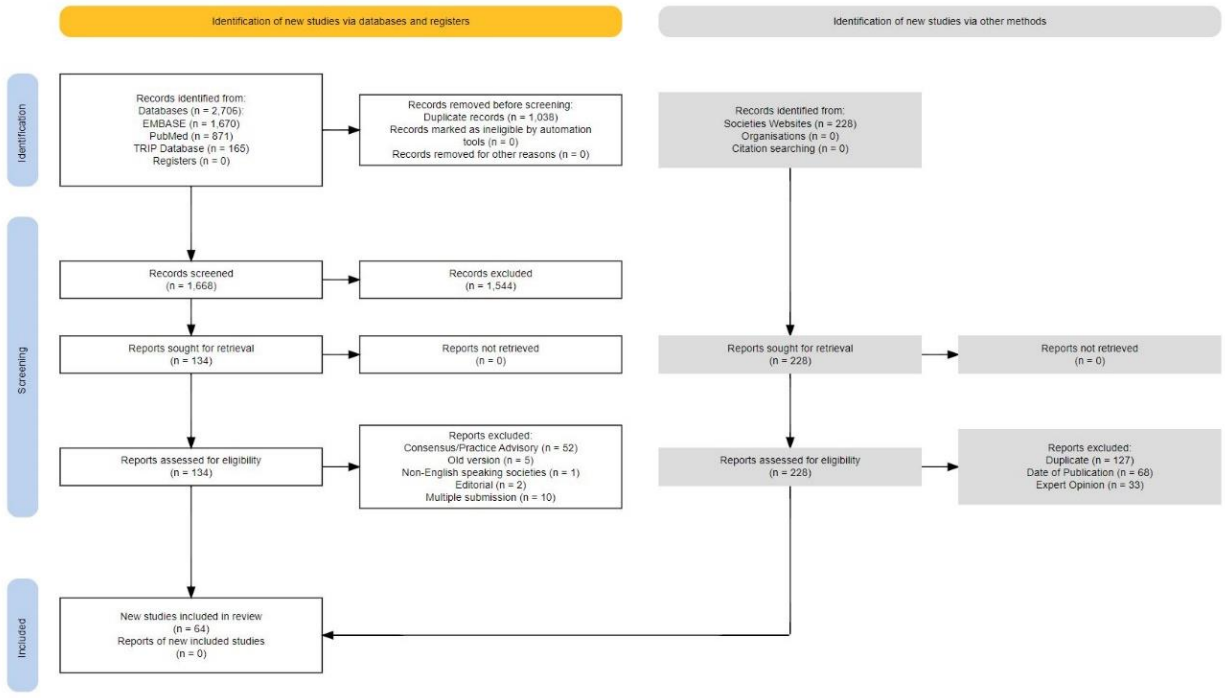
Figure



Atypical takotsubo cardiomyopathy post microlaryngoscopy dilatation of subglottic stenosis: a case report

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92

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INTRODUCTION

One of the complications of general anesthesia post operatively is hemodynamic instability, the deferential diagnosis can be listed from the most common as hypovolemia into the least common as acute nonischemic cardiomyopathy (Takotsubo syndrome). Takotsubo syndrome is a reversible acute heart failure because of nonischemic cardiomyopathy and characteristic regional motion abnormality, was first described in the Japanese population by Sato *et al*. in the 1990s.[1] The similarity of signs and symptoms for different reasons of this critical presentation requires a thorough examination and quick decision to guide the management of patient. Point of care Ultrasound, POCUS, considered as a crucial tool to diagnose such a rare critical condition in post anesthesia care unit and it can lead to a definitive diagnosis and optimum outcome for our patient.[2]

CASE PRESENTATION

A 52-yr-old female with idiopathic subglottic stenosis presented for microlaryngoscopy with balloon dilation of her subglottic stenosis. Her past medical history is significant for Sjogren's syndrome, hypothyroid and bronchial webbing (interstitial lung disease). After uneventful surgery and general anesthesia, she was transferred to postanesthesia care unit (PACU). after 30 min she developed an acute onset of atrial fibrillation with rapid ventricular response and borderline hypotension with mean arterial pressure around 65 mmHg. Patient was fully conscious, no chest pain, no signs or symptoms of heart failure, good capillary refill and her skin was warm to touch An immediate lung and Heart POCUS has been performed by her anesthesiologist and it showed no acute pathology in her lungs and her ECHO was positive for severely reduced left ventricular ejection fraction (EF was estimated visually to be 25–30%) and there was akinesis of all basal and mid ventricular segments and preserved apical contractility. Right ventricular function was preserved and there was no significant valvular pathology. As the patient had a normal ECHO before and the new imaging shows an acute cardiomyopathy with heart failure so a diagnosis of atypical Takotsubo syndrome was on top of the differential diagnosis, and patient transferred immediately to intensive care unit to further monitoring,

management of the acute heart failure as well as to confirm the diagnosis since it is a diagnosis of exclusion. The patient was discharged from hospital and followed up in cardiology clinic where another Echo was performed after one month and showed normal findings.

CONCLUSION

This case report emphasizes the role of point of care ultrasound for diagnosis unstable critically ill patients in perioperative period and how it can guide management without delay. TTE was performed by the anesthesiologist in the Post Anesthesia Care unit and the findings obtained immediately and the diagnosis of Reverse Takotsubo syndrome was the most likely to explain the patient presentation after excluding other causes. POCUS helped in continuity of care and a favorable outcome for this patient.

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Changes in health-related quality of life in young-old and old-old patients undergoing elective orthopedic surgery: a systematic review

Submission ID

17

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INTRODUCTION

Joint replacement surgery is a commonly performed operation, and demand is expected to increase with the aging population.[1] The primary objective of these procedures is to improve the quality of life for older patients. Nevertheless, there is a notable gap in research exploring differences in postoperative health-related quality of life (HRQoL) changes among patients aged 65 yr and older. Given the broad age range within the older population, there is a significant need to identify clinically relevant differences in HRQoL outcomes between young-old and old-old adults undergoing elective orthopedic surgery. This systematic review aims to investigate variations in HRQoL improvement, as assessed by patient-reported outcome measures, following total hip arthroplasty (THA), total knee arthroplasty (TKA), and partial knee arthroplasty (PKA) between young-old and old-old adults.

METHODS

A comprehensive search of six electronic databases was conducted from their inception dates to 15 May 2023. Inclusion criteria were patients aged ≥ 65 yr undergoing TKA, THA, or PKA who were assessed preoperatively and postoperatively using validated HRQoL assessment tools, including the EuroQol five-dimension (EQ-5D), Short Form 36 (SF-36), and Short Form 12 (SF-12). Qualitative analyses were performed for the included studies, summarizing study characteristics, patient demographics, pre- and postoperative HRQoL scores at common timelines (3-, 12-, and 24-months), and secondary outcomes. Descriptive summaries were provided for the primary outcome, which was the change in HRQoL postoperatively compared with the baseline score between young-old and old-old groups. Additional outcomes included postoperative complications, length of stay (LOS), and mortality. While consensus on the

optimal sub-classification of older adults into different age groups is lacking, several studies designated individuals aged 65–74 yr as young-old and those aged 75 and above as old-old.[2–4] Accordingly, we defined "young-old" as individuals aged 65–74 yr and "old-old" as those aged ≥ 75 yr. In cases where these age groups were not used, we classified the younger group (< 80) as "young-old" and the older age group (≥ 80) as "old-old."

RESULTS

The search yielded 12,229 articles; twelve studies (*n* = 103,613) were included. Studies using EQ-5D found no significant differences between young-old and old-old patients after hip and knee arthroplasty. Analyses of SF-36 and SF-12 scales showed no significant age-related differences in postoperative improvements in physical and mental health. Our review of four studies that included multivariable analyses revealed inconsistent associations between age and EQ-5D. Some studies reported enhanced EQ-5D improvements in older patients, while others suggested older age correlated with decreased postoperative EQ-5D change. Nonetheless, we found that even the old-old patients had measurable improvements in their HRQoL scores. Analysis of various factors influencing EQ-5D indicated preoperative EQ-5D had a negative correlation, while being female and not having comorbidities exhibited positive associations with EQ-5D improvement. Comparisons between young-old and old-old age groups in postoperative complications, hospital LOS, and mortality revealed no associated age-related changes in HRQoL.

DISCUSSION

Young-old and old-old patients exhibited comparable improvements in HRQoL following hip and knee arthroplasty. Older patients did not have higher rates of postoperative complications, longer hospital LOS, and increased mortality. Our comprehensive comparison of postoperative HRQoL changes within the wide age spectrum of the older population emphasizes that age is not a barrier to effective surgery. Challenging biased assumptions about older patients' tolerance and benefits from surgery is crucial, given the growing population aged 65 yr and older.[5] While chronological age is a consideration in joint arthroplasty, priority should be placed on assessing patients' comorbidities and functional status.

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Table Multivariate analysis of factors associated with postoperative EQ-5D change

First author, year	Postoperative timepoint (months)	Association between age and EQ-5D change	Other coefficients for EQ-5D change
Aalund, 2017	3 12	0.0026 (P<0.001) 0.0020 (P=0.001)	Preoperative EQ-5D score: -0.841 (P<0.001) -0.804 (P<0.001)
Gordon, 2014	12	Negative, non-linear association	Preoperative EQ-5D score: -3.9
Miao, 2018	6	n.s.	Women: 7.613 (P<0.05) No comorbidities: 3.259 (P<0.05) Employment status, living status, physical barriers at home: n.s.
Williams, 2013	6 24	Negative, linear association: P=0.013 P=0.033	NR

EQ-5D = EuroQol-5 dimension; NR = not reported = n.s. = not significant

Defining the minimal clinically important difference of days alive and at home within 30 days after inpatient noncardiac surgery

Submission ID

37

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INTRODUCTION

Days alive and at home within 30 days after surgery (DAH30) is a newly validated perioperative outcome that has garnered significant interest in recent years, in light of improved understanding of the gaps in patient-centred indices of surgical recovery. Unlike traditional measures of mortality, morbidity, and length of stay, DAH30 offers the advantage of encapsulating additional patient-centred aspects of the perioperative experience, including functional status, the quality of recovery and postdischarge disposition, while remaining equally accessible. To facilitate its use in research and quality improvement, there is a need to define the Minimal Clinically Important Difference (MCID) of DAH30, which specifies the minimum number of additional days at home after surgery that may be perceived as meaningful and relevant to patients beyond statistical significance alone. Our objective was to define and externally validate the MCID of DAH30 for patients undergoing elective noncardiac inpatient surgery at a population level.

METHODS

After Research Ethics Board approval, we conducted a cross-sectional analysis of linked health administrative data in Ontario (ON) and Nova Scotia (NS). This study included all patients aged ≥ 45 yr undergoing inpatient elective noncardiac surgery in the province of Ontario as well as two tertiary hospitals in Halifax from 2013 to 2017. Organ donors and patients with unlinkable records were excluded. DAH30 was calculated by subtracting 30 days by the number of days spent admitted in a hospital (including re-admissions) within 30 days after surgery. Patients who died intraoperatively or during the index hospitalization would be assigned a DAH30 value of 0. The MCID was evaluated using both distribution-based and anchor-based methods, as per recent expert-consensus methodology. For distribution-based methods, we calculated 0.3 standard deviation (SD), 5%, and 10% range of DAH30. For anchor-based methods, we calculated the median difference in DAH30 amongst 1) patients who had 30-day in-hospital

postoperative morbidity (composite of major complications including cardiac, respiratory, renal and neurological complications) compared to those who did not, and 2) patients who required a postoperative intensive care unit (ICU) admission, compared to those who did not.

RESULTS

We identified a cohort of 559,626 patients undergoing elective inpatient noncardiac surgery (15,477 patients in NS, 544,149 patients in ON) with a mean (SD) age of 67.6 (10) yr. 52.7% of patients were female and the median duration of surgery was 121 min [IQR, 95–182]. The median DAH30 was 25 days (22 to 27). The 5% and 10% of DAH30 range was 1.5 and 3.0 days, respectively, and the 0.3 SD was 1.9 days. Triangulation of these methods show a distribution-based MCID for DAH30 of 2.1 days. Composite postoperative morbidity occurred in 12.3% of patients and 6.5% of patients required postoperative ICU admissions. Anchor-based methods of MCID produced an MCID of 7 and 6 days, anchored to composite morbidity and ICU admission, respectively. The MCID of DAH30 did not differ based on sex or comorbidity indices, but urological and obstetrical/gynecological surgery showed a lower MCID in subgroup analysis.

DISCUSSION

We defined the minimal clinically important difference of DAH30 in the largest surgical cohort to date spanning two provinces in Canada and across all inpatient noncardiac surgical specialties. Distribution and anchor-based methods per recommended MCID methodology were used and the MCID values across clinical subgroups were compared. This will guide the clinical interpretation of DAH30 as a newly validated patient-centred perioperative outcome and inform future research and clinical trial design.

REFERENCES

No references.

Developing an environmentally sustainable quality improvement initiative: an optimized patient warming strategy

Submission ID

26

AUTHORS

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INTRODUCTION

Perioperative warming is a universal practice that is critical for the maintenance of intraoperative normothermia, which in turn prevents adverse events such as coagulopathy, surgical site infections, and myocardial injury.[1] Current perioperative patient warming strategies frequently employ the use of flannel blankets, despite their clinical inferiority,[2,3] and rely on forced air warming (FAW) as the mainstay of active warming. Alternative active warming therapies have shown comparable effectiveness,[2,3] yet the environmental and financial impacts of these different modalities have not been characterized. In this study, we developed an evidence-based, sustainable, optimized patient warming pathway (OPWP) and implemented it at a tertiary care centre.

METHODS

We first conducted an in-person audit and root cause analysis to identify wasteful and nonevidence-based warming practices at a tertiary care hospital. A total of 50 surgical patients were observed to quantify flannel blanket use, adherence to perioperative warming guidelines,[4,5] incidence of hypothermia, and patient reported outcomes (PROs). Concurrently, we compared the environmental and economic performance of four currently available warming devices—forced air warming (FAW), resistive blankets (RB), circulating water garments, and warmed flannel blankets—using environmental Life Cycle Analysis (E-LCA) and Life Cycle Costing (LCC) methodologies.

These results informed the OPWP, providing effective and appropriate patient warming while reducing flannel blanket use and preserving a single FAW gown throughout the perioperative journey.

The pathway was implemented using a multiphased approach with major interventions including: expanding prewarming criteria to meet evidence-based guidelines,[4,5] providing in-services and hands-on training for nursing teams, engagement of anesthesia and surgical staff

and trainees, installation of FAW devices in all post-surgical bays, gamification, and policy development.

An interim evaluation evaluated adherence to the OPWP, incidence of hypothermia, and PROs. Ethics were deemed unnecessary by the UBC REB as this study met criteria for a QI study.

RESULTS

We determined that the re-usable RB was the most sustainable patient warming device, producing 15–26x fewer greenhouse gas emissions when compared to the second most sustainable option, FAW. Flannel blankets represented the least sustainable option yet were used on average six times (1–11 range) per patient. Each blanket generated 0.31–0.36 kg CO_2 eq and cost $1.76–$2.67. Only 51% of patients received appropriate pre- and intraoperative active warming; 28% did not receive prewarming or any active warming despite having risk factors for hypothermia. The incidence of postoperative hypothermia was 8% and PROs were favourable.

Postintervention, active warming in the postanesthesia recovery unit increased from 0% to 50% and flannel blanket use decreased by 40% per patient. 81% of patients received appropriate pre- and intraoperative warming and the incidence of hypothermia dropped to 0%.

DISCUSSION

Given the predominant use of FAW at our facility, preserving the FAW gown and minimizing flannel blanket usage were identified as the most practical implementation strategies.

Our OPWP offers a practical framework for providing environmentally sustainable, economical, and effective perioperative warming. This study effectively integrates environmental and economic impact analysis with quality improvement methodology and an extensive implementation strategy to show how low carbon care can be integrated into high quality health care delivery.

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Effectiveness of dexmedetomidine during surgery under general anesthesia on patient-centred outcomes: a systematic review and Bayesian meta-analysis

Submission ID

59

AUTHORS

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INTRODUCTION

Dexmedetomidine (an alpha-2 agonist) has been increasingly used off-labelled as an opioid minimization strategy for surgical patients during and after general anaesthesia.[1] This strategy can reduce short-term opioid use as well as opioid-related adverse events, however, its impact on patient-centred outcomes (i.e., outcomes that are meaningful to patients) and clinically important adverse events remains uncertain.[2] Patient-centred outcomes are recommended in the evaluation of opioid minimization strategies, but they are critically underreported in randomized clinical trials (RCTs).[3,4] Our main objective is to evaluate the impact of dexmedetomidine initiated during surgery compared to placebo, opioid, or usual standard of care on patient-centred outcomes among adult surgical patients under general anaesthesia and determine the certainty of evidence.

METHODS

We conducted a systematic review and Bayesian meta-analysis following the Cochrane's Handbook recommendations. We searched MEDLINE, Embase, CENTRAL, Web of Science, and CINAHL, and included RCTs evaluating the intraoperative use of dexmedetomidine that reported at least one patient-centred outcome. Our primary outcome was the postoperative Quality of Recovery (QoR). Our secondary outcomes included patients' well-being, function, health-related quality of life, life impact, multidimensional acute pain, chronic pain, persistent opioid use, opioid-related adverse events, hospital length of stay, and clinically important adverse events (i.e., requiring an intervention). Citations were identified, screened, and extracted in duplicates. We conducted meta-analyses using random effects Bayesian model with weak informative prior. We estimated the probability of achieving any benefit as well as the probability of achieving a clinically significant benefit (minimally important difference = 6 units for QoR-15). Tools with similar constructs were pooled as standardized mean difference and converted to their respective original scales to facilitate clinical interpretation.[5] We assessed statistical heterogeneity with the tau-squared and explored sources of heterogeneity with meta-regressions. We assessed the risk of bias of RCTs using the Cochrane's Risk of Bias 2.0 tool and the certainty of evidence using the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) methodology.

RESULTS

We identified 49,069 citations from our search strategy, of which 44 RCTs involving 5,904 participants were included in our meta-analyses. The median duration of infusion was 2.3 hr [IQR, 1.7–3.9] and the median dose of the bolus and intraoperative infusion respectively were 0.5 $\mu g \cdot kg^{-1}$ [IQR, 0.5–1.0] and 0.5 $\mu g \cdot kg^{-1} \cdot h^{-1}$ [IQR, 0.4–0.5]. Intraoperative dexmedetomidine administration was associated with an improvement in postoperative Quality of Recovery (mean difference [MD] in QoR-15 = 8.88; 95% credible interval [CrI]; 3.46 to 14.22, *n* = 21 RCTs, low certainty of evidence). We found a 99% probability of any benefit and 86% probability of clinically meaningful benefit. We estimated a 99% probability of any benefit on chronic pain incidence (low certainty of evidence), and 94% (clinically significant hypotension) and 96% (clinically significant bradycardia) probabilities of harm (both very low certainty of evidence).

DISCUSSION

In our systematic review and meta-analysis, we found a high probability that dexmedetomidine initiated during surgery under general anaesthesia may lead to a clinically appreciable improvement in the quality of recovery and chronic pain after surgery. We also found an increased risk of hypotension and bradycardia requiring intervention that was supported by very low certainty of evidence. This shows the need for further high-quality RCTs to determine the safety and effectiveness of intraoperative dexmedetomidine among adult surgical patients.

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Feasibility of an online, self-administered cognitive screening tool in older patients undergoing ambulatory surgery

Submission ID

79

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INTRODUCTION

An increasing number of older adults are undergoing surgery on an ambulatory basis. Up to 37% of older adults undergoing elective noncardiac surgery may have undiagnosed cognitive impairment.[1] Cognitive impairment is associated with increased rates of perioperative delirium and other adverse outcomes,[2] however, there are few studies on perioperative neurocognitive disorders (PND) in older adults undergoing ambulatory surgery. Preoperative cognitive screening of older adults has been recommended but is challenging to perform in busy preoperative clinics.[3] Self-administered computerized assessments may have potential benefits compared to traditional cognitive assessments including remote assessments, not needing an administrator, automated scoring, decreased assessor bias, and higher standardization. The objective of this study was to assess the feasibility of using the Brain Health Assessment (BHA)—a self-administered, web-based cognitive screening tool previously validated in the general population against the MoCA to screen older adults for cognitive impairment before ambulatory surgery.[4,5]

METHODS

Research ethics board approval was obtained. Inclusion criteria: adults (> 65 yr of age) undergoing ambulatory surgery, proficient in English. Exclusion criteria: intracranial surgery or previous diagnosis of major neurocognitive disorders. Written informed consent was obtained from all participants. The primary feasibility outcome was implementation (recruitment and retention rate). Other feasibility outcomes included acceptability (satisfaction with the BHA), demand (to what extent the BHA is likely to be used by patients, and practicality (to what extent the BHA can be carried out with intended participants). We hypothesized that: 1) recruitment rate would meet 30%, with 90% retention, 2) > 70% of participants would find the BHA satisfying, 3) the BHA would be preferred by > 50% of participants, and that 4) >70% of participants would be comfortable and capable of completing the BHA. Participants who could

not complete the BHA because of lack of computer competency, or who were unwilling to participate long-term, were asked to complete baseline assessments and the Animal Fluency Test (AFT) prior to surgery. Participants with computer competency were asked to complete the BHA preoperatively and 1 week, 1 month, and 3 months following surgery as well as a BHA usability survey at one week following their surgery.

RESULTS

A total of 458 participants were assessed for eligibility. Reasons for exclusion are shown in the Figure. A total of 78 participants were recruited with a median age [IQR] of 70.0 [66.8–74.3], 41/78 (41%) female participants, 64/78 (84.2%) participants with higher than high-school education. Sixty-one participants agreed to do the BHA, and 56 completed the baseline BHA assessment.

Implementation - recruitment rate was 23%, with retention rate of 55/61 (90%) at one week, 51/61 (83%) at one month, and 40/61 (65.5%) at three months.

Acceptability was high with 55/56 (99.2%) of participants finding the BHA website easy to navigate and language easy to understand. Demand was high with 55/56 (99.2%) participants preferring digital to provider-administered assessments. Practicality was high with 70/75 (93.3%) of participants comfortable with using computers, 64/78 (82%) participants using computers on a daily basis, and 47/56 (83.9%) found the BHA to be not technologically challenging.

DISCUSSION

Our feasibility outcome, recruitment rate was lower than anticipated. The retention rates were high at one week and one month but decreased three months after surgery. This may be partially attributed to the study being conducted during the COVID-19 pandemic as many participants cited being over-burdened with telephone/virtual assessments. Of the other feasibility outcomes, acceptability, demand, and practicality were high. The high rate of baseline completion of the BHA and its favourable useability by participants in this study suggests that the BHA may be a feasible cognitive screening tool in more technologically savvy older adults undergoing ambulatory surgery.

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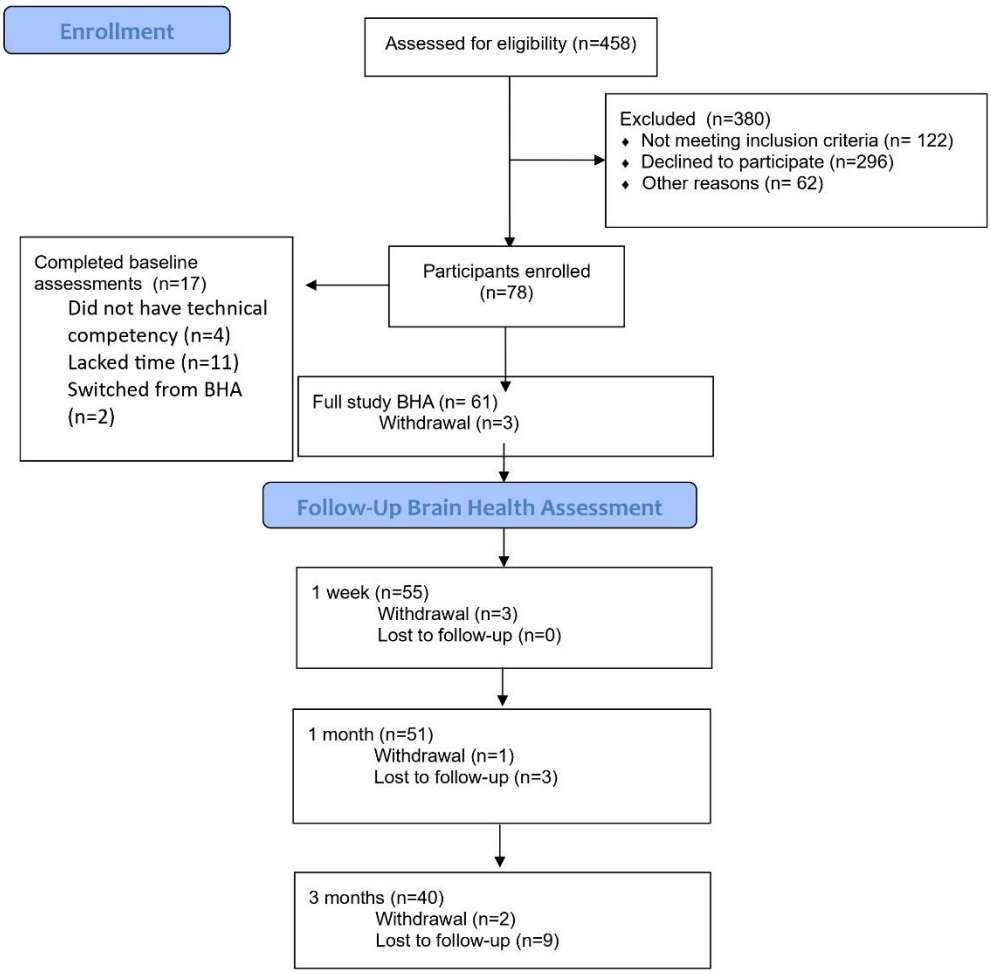
Figure



Intraoperative hypotension during liver transplantation and acute kidney injury: a retrospective cohort study

Submission ID

120

AUTHORS

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INTRODUCTION

Acute Kidney Injury (AKI) after orthotopic liver transplantation occurs frequently and is associated with prolonged intensive care unit (ICU) and hospital stay, increased risk of developing chronic renal disease, and decreased graft survival. Recent study showed that a mean arterial pressure (MAP) of < 55 mm Hg for a duration over 20 min is associated with postoperative AKI.[1] This intraoperative hypotension is a potential modifiable risk factor for the clinician.

With the current study we aimed to determine in which of the different phases of liver transplantation hypotension has the strongest association with AKI: the an-hepatic or the postreperfusion phase. This would provide guidance to the clinician if one would aim to minimize the occurrence of hypotension.

METHODS

This was a retrospective single-centre cohort study in adult patients undergoing liver transplantation between January 2016 and June 2022. The local research ethics board approved the study with a waiver for informed consent. Exclusion criteria included combined kidney-liver transplant or multivisceral transplant, absence of digital hemodynamic data, death or retransplantation within 48 hr. Primary outcome was AKI defined as the Kidney Disease Improving Global Outcomes (KDIGO) criteria:[2] an absolute increase in serum creatinine of 26.5 $umol \cdot L^{-1}$ or a relative 1.5 increase from baseline value. The exposure was hypotension, defined as the duration (in minutes) below MAPs of 75, 70, 65, 60, 55, 50, 45, and 40 mm Hg, during the total duration of transplantation, during the an-hepatic phase and neohepatic phase. Multivariable logistic regression analysis was used to explore the association between

intraoperative hypotension, quantified by time duration (in min) under various MAP thresholds, and the primary outcome of early postoperative AKI according to the KDIGO criteria.

RESULTS

The etiology of liver disease of 1,259 patients included, was HCC (39%), alcoholic cirrhosis (21%), nonalcoholic steatohepatitis (20%) and Hepatitis C (20%). Median age was 58 yr, median MELD-NA score was 19 (SD, 12–29) and 34% of the donor type was living-related. Classic caval interposition was used in 74% and full caval clamp in 80% of cases. Cold ischemic time was 346 min (SD, 151–473) and warm ischemia 48 min (SD, 37–59). Median estimated blood loss was 2.5L (SD, 1.5–4.1). Transfused units of red blood cells were 3 (SD, 1–6).

AKI occurred in 577 patients (46%). Univariable analysis showed an association between AKI and MAP < 55 mm Hg for > 20 min (OR, 2.3; 95% confidence interval [CI], 1.3 to 4.1). During the an-hepatic phase the association became apparent at a MAP < 60 mm Hg for > 20 min (OR, 1.5; 95% CI, 1.0 to 2.3) and became stronger at MAP < 55 mm Hg for > 20 min (OR, 2.4; 95% CI, 1.2 to 5.2). Confounder for the association was an etiology of acute hepatic failure.

DISCUSSION

Intraoperative hypotension (MAP < 55 mm Hg) is independently associated with AKI following liver transplantation. In the current study we found that this association is mainly because of hypotension during the an-hepatic phase and not during the neo-hepatic phase. Additional hemodynamic support should be considered in the an-hepatic phase to optimize postoperative kidney function.

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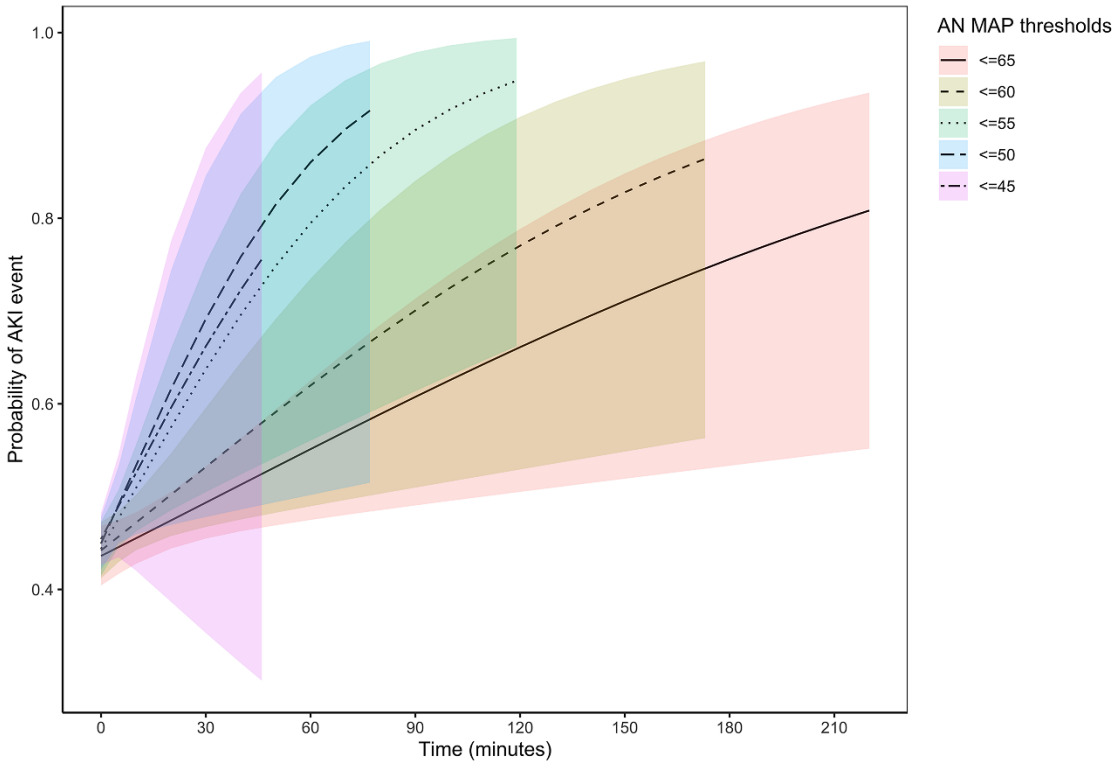
Figure


1.0
0.8
0.6
0.4
Probability of AKI event
0
30
60
90
120
150
180
210
Time (minutes)
AN MAP thresholds
<=65
<=60
<=55
<=50
<=45

Optimizing patient-centred and environmentally sustainable preoperative anesthesiology care through virtual consultation: a population-based comparative effectiveness study

Submission ID

38

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INTRODUCTION

More than 300 million surgeries are performed annually.[1] Most are elective and involve a preoperative anesthesiology consultation. Observational data consistently suggest consistent benefits in reducing morbidity, mortality, length of stay (LOS) and costs.[2,3]

While anesthesiology consultations appear to provide benefit, the process of preoperative consultation has detrimental impacts for patients and the environment. Travel for preoperative visits contributes to the estimated 5 million kg of carbon dioxide equivalents (KgCO2-eq) generated yearly in providing surgery.[4] Patients also identify logistical challenges in accessing in-person appointments.

Virtual delivery of anesthesiology consultations represents a strategy that could reduce the carbon intensity of routine perioperative processes, and improve access for patients. Introduction of virtual consults during the pandemic represents a natural experiment that can be harnessed to estimate the comparative effectiveness of virtual *vs* in-person consultations in terms clinical outcomes, carbon emissions, and travel time.

METHODS

Research ethics board review was waived under provincial privacy legislation. This was a historical population-based cohort study using linked administrative data.

We identified all American Society of Anesthesiologists (ASA) Physical Status III–IV adults having preoperative anesthesiology consultation prior to elective, intermediate- to high-risk, noncardiac surgery in one Canadian province (1 October 2020 to 1 March 2022). The exposure was virtual *vs* in-person anesthesiology consultation, identified using validated physician billing codes. The primary clinical outcome was 90-day mortality or major morbidity (Clavien-Dindo grade 3–5); secondary outcomes were 90-day: mortality, LOS, days alive and at home (DAH), and health system costs. Environmental and patient-convenience outcomes were KgCO2-eq and estimated travel distance, calculated using validated methods.

Clinical outcomes were analyzed under a noninferiority framework, with a relative margin of 1.10 (noninferiority concluded if the upper 2-sided 95% confidence interval [CI] was < 1.10). Confounder adjustment used propensity score (PS) overlap weights, with the PS based on age, sex, year of surgery, hospital type, income quintile, surgery type, all Elixhauser comorbidities, ASA score, cancer status, frailty index score, and receipt of a concurrent preoperative medical consultation. Regression outcome models then adjusted for the PS overlap weight and for individual hospital using generalized estimating equations.

RESULTS

Among 24,135 nonorthopedic elective surgeries identified, 8,628 patients had an in-person anesthesiology consultation while 8,399 had a virtual consultation in 60-days before surgery. Prior to weighting, virtual consult patients were more likely to go to a teaching centre, have peripheral artery surgery or endovascular aneurysm repair; in-person consults were more common for ASA Physical Status IV and thoracic surgery patients. PS-weighted cohorts had no differences in baseline variables.

Prior to PS-weighted adjustment, virtual consultation was associated with greater morbidity and mortality (OR, 1.08; 95% CI, 1.01 to 1.16); after adjustment, the noninferiority of virtual consults with morbidity and mortality was inconclusive (OR, 0.99; 95% CI, 0.89 to 1.101). Noninferiority of secondary clinical outcomes was found for LOS, total costs, DAH, and major morbidity; noninferiority was inconclusive for mortality (see Figure).

Each virtual visit was estimated to save 42 (SD 83) km of driving distance, and to reduce 8,618 (SD, 17,199) KgCO2-eq emissions.

DISCUSSION

In a population-based study, we found inconclusive evidence for the noninferiority of virtual anesthesiology consultations compared to in person for the primary outcome of major morbidity and mortality; noninferiority was shown for associations with LOS, costs, DAH, and major morbidity. As randomized trials and meta-analyses[5] suggest that virtual consults are noninferior to regarding cancellations and processes of care, our data may support ongoing use of virtual anesthesiology consultations. As virtual consults support health system sustainability and convenience, these data could help patients make an informed decision regarding the modality of preoperative consultation that best fits their needs and preferences.

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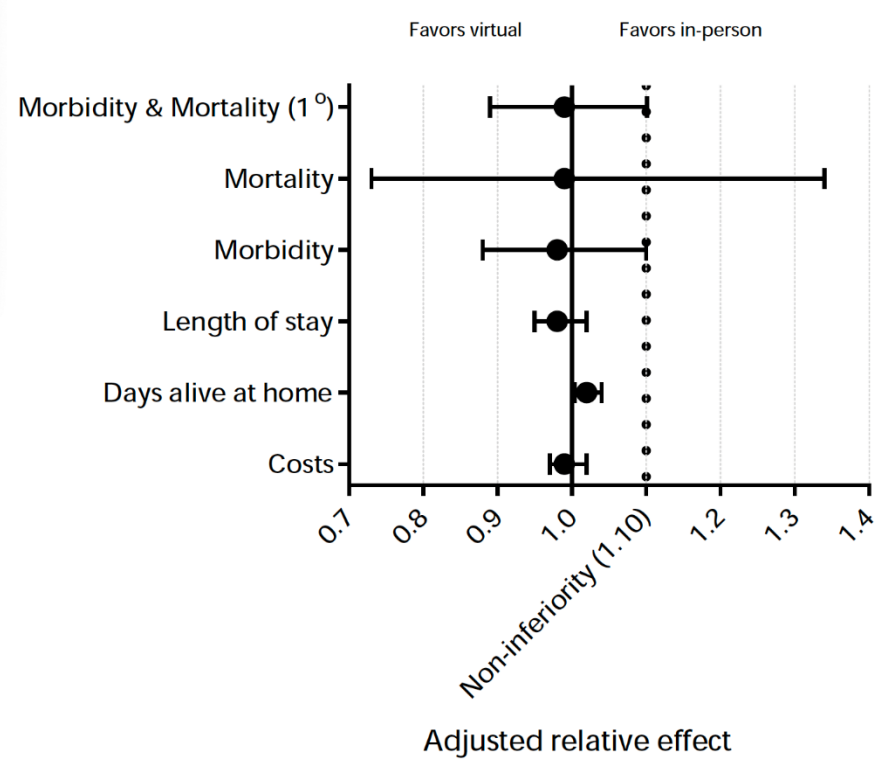
Figure



Perioperative outcomes among patients from northern and southern Ontario undergoing major elective surgery: a population-based cohort study

Submission ID

44

AUTHORS

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INTRODUCTION

While patient-specific and procedural risk factors are established predictors of surgical outcomes, social determinants of health have emerged as important perioperative risk modifiers for Canadian patients. Recent studies have found evidence that indigenous identity is associated with increased postoperative mortality and morbidity.[1] In Northern Ontario, well-defined geographic and socioeconomic constraints contribute to multiple health care disparities including life expectancy that is two years shorter than Southern counterparts.[2] Northern residents often travel longer distances to access tertiary care which may contribute to barriers in obtaining timely surgical care as well as receiving adequate postoperative follow up.[3] To date, there have been no studies comparing postoperative outcomes between Northern and Southern Ontario residents. The objective of this study was to measure and compare key postoperative outcomes in Northern and Southern Ontario patients undergoing elective major noncardiac surgery.

METHODS

All data used for this project are routinely collected and anonymized, exempting institutional review under section 45 of Ontario's Personal Health Information Protection Act. This was a population-based retrospective cohort study conducted in Ontario, Canada using a linked administrative health care dataset. All Ontario residents aged 18 or older on the day of elective, major noncardiac surgery from 1 April 2009 to 31 March 2021 were identified. Sex-neutral surgeries established to be of intermediate to high physiologic stress were included.[4] Additionally, only the first eligible surgery for each participant during the study period was included. Northern Ontario residency status was determined based on each patient's postal code, identifying those living in the Northeast and Northwest Local Health Integration Networks, with all other patients designated Southern Ontario residents. The primary outcome

was 30-day mortality after surgery. Secondary outcomes were days alive at home, hospital length of stay, total health care system costs, discharge disposition and readmissions. Adjusted and unadjusted associations of Northern Ontario residency status with the aforementioned outcomes were estimated using regression models. Adjusted models included the follow prespecified covariates: sex, age, neighborhood income quintile, rurality, year of surgery, surgical procedure, comorbidities, and number of prior hospitalizations and emergency department visits.

RESULTS

We identified 562,115 elective surgical cases that met the inclusion criteria which included 41,191 patients from Northern Ontario. The Northern residents were more likely to belong to the lowest income quintile, travelled longer distances to their hospital, and were less often rostered with a family physician. Mortality within 30 days of surgery did not differ geographically, with 89 (0.2%) deaths in the Northern cohort compared to 1,114 (0.2%) Southern Ontario patients (adjusted odds ratio [OR], 1.04; 95% confidence interval [CI], 0.85 to 1.27). Total health care costs were lower for Northern residents at 30 days (adjusted ratio of mean [RoM], 0.92; 95% CI, 0.89 to 0.86) and 365 days (adjusted RoM, 0.93; 95% CI, 0.90 to 0.96), while length of stay was longer (adjusted RoM, 1.06; 95% CI, 1.01 to 1.11) for Northern residents. The number of days alive at home, nonhome discharges, and readmission rates were similar between the two groups.

DISCUSSION

Although Northern Ontario residents face multiple health care challenges, they were not found to experience more postoperative mortality after major elective surgery. Although there were small differences in health care costs and hospital length of stay, there were overall no clinically meaningful differences in perioperative outcomes between Northern and Southern Ontario patients. The observed trend toward differences in nonhome discharge dispositions and health care costs may suggest variations in access to health care resources across the province. Further research is required to better understand these trends and their implications for health care delivery and patient outcomes in different regions.

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Preoperative concerns of patients aged 50 years and older undergoing noncardiac surgery: a systematic review and meta-analysis

Submission ID

118

AUTHORS

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INTRODUCTION

In the preoperative setting, patients often experience feelings of intense worry surrounding their upcoming surgery.[1] Older adults (≥ 50 yr) undergoing noncardiac surgery possess unique concerns, influenced by age-related needs, perceptions, and health-status.[2,3] When left unaddressed, these concerns can manifest as preoperative anxiety and act as independent risk factors for postoperative morbidity and mortality.[1,3] They can also negatively impact functional trajectory and recovery.[4] Despite the rapidly aging population, the unique preoperative concerns in patients of this demographic have not been systematically examined.[5] This systematic review and meta-analysis aims to comprehensively summarize the preoperative concerns of patients aged 50 yr and older undergoing noncardiac surgery. By elucidating the nature of these concerns, tailored preoperative interventions can be designed to decrease the incidence of preoperative anxiety and improve postoperative outcomes.[5]

METHODS

A literature search was conducted across five databases from 2000 to March 26, 2023. The inclusion criteria were: 1) patients aged ≥ 50 yr undergoing noncardiac surgery with overnight stay; 2) presence of concerns identified in the preoperative period; 3) preoperative concerns collected with valid instruments; 4) at least one preoperative concern outcome reported (mean or incidence); 5) randomized controlled trials, prospective cohort studies, and cross-sectional studies; and 6) English language. Seventeen articles (1,777 participants) were included after abstract and full-text screening. Data on study characteristics, participant characteristics, identified concerns, and their relative rankings (based on the reported outcomes of each study) were extracted. Identified concerns were thematically classified into domains and subdomains. Studies employing instruments that assessed two concerns or less were analyzed using comparative analysis. For studies assessing three or more concerns, the

top concern domains and subdomains were identified using a proportional frequency analysis. This was accomplished by calculating the frequency at which each domain and subdomain ranked within the top five concerns across studies, relative to its total frequency of assessment across all studies. Meta-analysis was performed when two or more studies assessed concerns using the same questionnaire.

RESULTS

Studies were divided into mixed noncardiac (*n* = 549), orthopedic (*n* = 645), vascular (*n* = 444) and oncologic surgery (*n* = 139). Concerns were categorized into seven domains: 1) anesthesia, 2) complications, 3) impact to daily life, 4) medical experience, 5) pain, 6) recovery and rehabilitation, and 7) surgery. Twelve studies (*n* = 1,485) employed scales evaluating three or more concerns (Table). Of these, pain was the most important concern among mixed noncardiac and orthopedic surgical populations but was ranked comparatively lower in vascular and oncological surgery patients. Vascular surgery patients were most concerned about surgery and complications, while patients undergoing cancer surgeries prioritized complications and the medical experience. Seven studies (*n* = 879) employed scales that solely compared surgery and anesthesia-related concerns. Of these, surgery ranked higher in all studies. The pooled mean difference between surgery-related anxiety and anesthesia-related anxiety was 1.54 in orthopedic and oncologic surgery populations (95% confidence interval, 1.12 to 1.95, $I^2 = 0\%$; $P < 0.001$).

DISCUSSION

The preoperative concerns of older noncardiac surgical patients vary greatly depending on the nature of the surgical procedure. The fear of pain is especially prevalent in older orthopedic surgery patients, which may be attributed to the painful nature of joint replacements. In comparison, vascular surgeries which are typically higher-risk and more complex generate worries about the surgery itself and postoperative complications. Oncological surgeries invoke fears about complications and medical experience because of its association with potential malignancy. These observed results emphasize the importance of tailoring preoperative counseling to address specific fears of each surgical population.

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Table Top domains and subdomains for different types of surgery

Surgery type	Studies (n)	Sample[a]	Top 3 Domains	Top 5 Subdomains (Associated Domain)
Mixed Surgery[b]	3	425	1 Pain	1 General Cx fear
			2 Cx	2 Postop pain
			3 Surgery	3 Personal life disruption (Impact on Daily Life)
				4 Recovery (Recovery/Rehabilitation)
				5 General surgery fear
Orthopedic Surgery	7	645	1 Pain	1 General surgery fear
			2 Anesthesia	2 General pain fear
			3 Surgery	3 Anesthesia risks
				4 Postop pain
				5 Intraop pain
Vascular Surgery	1	385	1 Surgery	1 General Cx fear
			2 Cx	2 General surgery fear
			3 Anesthesia	3 Anesthesia risks
				4 Anesthesia side-effects
				5 Postop pain
Oncological Surgery	1	30	1 Cx	1 Fear of the unknown (Medical Experience)
			2 Anesthesia	2 General Cx fear
			3 Medical experience	3 Surgery specific Cx
				4 Surgical outcome
				5 Anesthesia risks

[a]The sample size was summed across all studies evaluating each surgery type
[b]Mixed surgeries include: abdominal, breast, cardiac, colorectal, general, gynecologic, neurosurgery or neurosurgery spine surgery; ophthalmologic, oral, orthopedic, otolaryngology, plastic, urologic, and vascular surgeries

Preoperative depression and health-related quality of life following cardiac surgery: a systematic narrative review

Submission ID

89

AUTHORS

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INTRODUCTION

Depression is highly prevalent among adults undergoing cardiac surgery with estimates ranging from 19–37%.[1] Preoperative depression is known to confer an increased risk for adverse clinical outcomes following cardiac surgery including infection, cardiac complications, rehospitalization, and mortality.[2] Depression may also be a predictor of various patient-reported outcomes such as health-related quality of life (HRQoL), which is an important indicator of patient satisfaction and surgical success.[3] Nevertheless, the association between preoperative depression and HRQoL after cardiac surgery in adults has not yet been thoroughly reviewed.

METHODS

This systematic review searched Medline, Embase, CENTRAL, and PsychINFO for studies examining adults undergoing cardiac surgery that reported the association between preoperative depression and postoperative HRQoL outcomes. Articles were screened by two independent reviewers, and data from eligible studies were extracted using a standardized collection form. We collected data on study and participant characteristics, depression measure, HRQoL measure, and statistical estimates related to the association between preoperative depression and HRQoL outcomes at any time after cardiac surgery. A narrative synthesis was only performed on the most commonly reported HRQoL measure, the Short Form 36 (SF-36) and its derivative scales, given significant heterogeneity in study design across included studies.

RESULTS

Four thousand, five hundred and fifty-four patients from 11 studies reported outcomes from SF-36 or derivative scales. Seven studies reported adjusted estimates between preoperative

depression and SF-36 summary scores up to one year: physical component score (PCS) and/or mental component score (MCS). Preoperative depression was associated with lower MCS and less MCS improvement in five studies. One study reported increased odds of MCS improvement. Depression was associated with a lower postoperative PCS and less PCS improvement in one study and two studies, respectively. Four studies reported no impact of depression on PCS. Additionally, three studies reported adjusted estimates with SF-36's subscale scores up to six months. Depression was negatively associated with 'energy/fatigue' and 'general health' scores in these studies. Depression was also negatively associated with 'social functioning' and 'role limitations because of emotional health,' but not 'emotional well-being' at six months.

DISCUSSION

This review highlights the detrimental and independent impact of preoperative depression on HRQoL up to one year following cardiac surgery, especially the mental or psychologic domain. Depression also had a negative impact on self-perceived energy, health, and general functioning (e.g., social, occupational, and daily activities) at six months. Nevertheless, heterogeneity of the included studies precluded meta-analyses. Further work is needed to quantify the impact of preoperative depression on patient-reported outcomes including HRQoL after cardiac surgery. A better understanding of these relationships will inform tailored patient counseling and the development of perioperative mental health screening and management protocols in this population.

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Role of cerebral oximetry in reducing postoperative end organ dysfunction after major noncardiac surgery

Submission ID

28

AUTHORS

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INTRODUCTION

With the increase in life expectancy observed in the last decades, the elderly population with multiple comorbidities requiring general anesthesia for major noncardiac surgery has increased dramatically. Major postoperative complications in this subgroup of patients have been reported in the range of 20%.[1] Regional cerebral oxygen saturation (rSO_2) provides a noninvasive alternative to systemic oxygen balance that correlates well with the gold standard of mixed venous oxygen saturation.[2] Interventions designed to minimize perioperative reduction in rSO_2 may improve overall outcomes, particularly if rSO_2 is considered a reflection of adequacy of global perfusion using brain as the index organ.[3] We hypothesized that implementation of a cerebral oximetry-based management strategy would reduce end organ dysfunction and its associated postoperative morbidity after major noncardiac surgery.

METHODS

After research ethics board approval, and informed patient consent, we conducted a prospective double-blind randomized controlled clinical trial in elderly patients undergoing major noncardiac surgery. Bilateral cerebral oximetry sensors (Masimo, Root® O_3™ Regional Oximetry) were placed on the fronto-temporal area before induction of anesthesia to measure rSO_2 intraoperatively. Patients were randomized to either an interventional group; where a predetermined standardized algorithm was used in an attempt to restore rSO_2 only if rSO_2 reduced 10% below the baseline value for at least 15 sec, or a control group, where patients were managed based on routine clinical practice. The cerebral oximetry monitor was blinded in the control arm but the data was recorded continuously. The algorithm to restore rSO_2 included adjustments to increase cerebral perfusion pressure, FiO_2, end-tidal CO_2, depth of anesthesia, hematocrit, and cardiac index. This sequence was not reinforced to any specific order. Major postoperative adverse outcomes, quality of recovery scores (QoR-15), disability free survival (WHODAS-2), and length of hospital stay were recorded. Continuous data were analysed with *t* test or Mann–Whitney *U* test. Categorical data was analyzed with Chi square or Fisher's Exact

tests. Statistical analysis was conducted using MINITAB® statistical software. *P* value < 0.05 was considered significant.

RESULTS

A total of 101 patients were randomized to either the interventional (*n* = 52), or control groups (*n* = 49), respectively. There was no difference between the two groups with respect to demographic data and surgical characteristics (Table A). Cerebral desaturation occurred in 30 (58%) and 31 (63%) patients in the interventional and control groups, respectively. Cumulative cerebral desaturation time was longer in the control group; 23 ± 48 min *vs* 9 ± 15 min, *P* = 0.01. There were a total of 142 algorithm-based interventions with a median of 2 [range, 1–12] in the interventional group. Postoperative morbidity and functional outcomes were similar between the two groups (Table B). The current study was powered to recruit 394 patients (NCT03861026), however, because of the COVID-19 pandemic and the lack of ongoing funding, the study was halted at 101 patients.

DISCUSSION

A drop in rSO_2 for more than 10% from the baseline values occurred in more than a half of patients undergoing major noncardiac surgery. The restoration of rSO_2 was achieved in 45 patients (86.5%) in the interventional group. Even though the duration of cumulative desaturation was significantly longer in the control group, the major postoperative morbidity and functional recovery was similar between the two groups. Future studies need to be adequately powered to determine the appropriate utility of intraoperative cerebral oximetry in patients undergoing major noncardiac surgery.

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Table A) Baseline characteristics and B) postoperative outcomes

	Variable	Intervention Group (n = 52)	Control Group (n = 49)
Part A	Age, years	70 ± 5	69 ± 6
	Male gender	25 (48)	27 (55)
	Frailty scale	2.5 [1, 5]	3 [1, 7]
	Duke Activity Status Index	24 [5, 51]	21 [7, 58]
	Duration of surgery, min	362 ± 148	328 ± 117
	Perioperative blood product transfusion	5 (10)	4 (8)
	Intraoperative fluid balance, ml	2229 ± 1352	1913 ± 895
	Perioperative vasoactive drugs	13 (25)	12 (24)
Part B	Postoperative composite morbidity	8 (15%)	7 (14%)
	Length of hospital stay, days	3 [1, 16]	3 [1, 14]
	Quality of Recovery-15 (baseline)	127 [99, 150]	124 [48, 148]
	Quality of Recovery-15 (postoperative day 1)	105 [54, 145]	108 [64, 127]
	Quality of Recovery-15 (hospital discharge)	110 [44, 145]	111 [64, 135]
	Disability free survival at 6 months (WHODAS-2)	4 [1, 23]	4 [1, 34]

Data expressed as mean ± SD, number of patients (%), and median [range]

Composite morbidity included postoperative delirium, stroke, transient ischemic attacks, myocardial infarction, pulmonary embolism, renal failure, pneumonia, atrial fibrillation, massive transfusion, prolonged mechanical ventilation, major wound disruption, sepsis, reintubation, and an unplanned return to the operating room

Solutions to reduce burnout syndrome among perioperative health care providers in low resources settings: a qualitative study

Submission ID

41

AUTHORS

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INTRODUCTION

Research from high-income contexts indicates that perioperative care providers may be at high risk for burnout, with significant downstream effects on patient safety.[1,2] Many interventions to reduce or prevent burnout among health care providers have been developed but very few focus on low-resource settings.[3,4] Adequate solutions to address burnout may be particularly important in low-income countries such as Rwanda where there are already very few health care workers and lack of motivation may also result in those workers either leaving health care or the country. This study aimed to explore solutions to address burnout among Rwandan perioperative care providers.

METHODS

Semistructured interviews were conducted with perioperative care providers (obstetricians, surgeons, anesthetists, midwives, nurses) in hospitals across all five provinces in Rwanda. Interviews were thematically analyzed with a qualitative case-study approach.

RESULTS

The findings from this study suggest specific individual level solutions such as facilitating healthy behavior and coping mechanisms, and mainly system level solutions such as building resilience; ensuring availability of equipment, supplies, and drugs; reducing staffing shortages and motivating existing staff in effort to decrease attrition; increasing awareness and advocacy

about burnout both within the health care community and general population; and better remuneration.

DISCUSSION

Only few burnout prevention interventions have been tested in low- and middle-income countries especially in Sub-Saharan Africa (SSA). Some examples include the Workplace Wellness Program (WWP) in Botswana and burnout awareness, emotional empowerment, and stress management programs in the middle east countries.[3,4] Context-specific interventions at both individual level (i.e., facilitating coping mechanisms) and system level (i.e., better working conditions such as adequate equipment, staff, remuneration, awareness programs, etc.) have the potential to decrease burnout among perioperative health care providers in low resources settings. More studies are needed to test the implementation of burnout reduction interventions in low- and middle-income countries.

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The impact of glucagon-like peptide-1 receptor agonist use on gastric emptying half-time: a systematic review and meta-analysis

Submission ID

81

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INTRODUCTION

Since 2022, glucagon-like peptide-1 receptor (GLP-1R) agonists have been used as frontline therapy for type 2 diabetes mellitus (T2DM).[1] Recently, their application has extended to chronic weight management, leveraging a mechanism believed to involve delayed gastric emptying and the promotion of early satiety.[2] Nevertheless, this may have implications for the risk of pulmonary aspiration of gastric contents in the perioperative period.

Current surgical recommendations advocate for the cessation of long-acting GLP-1R agonists at least a week prior to the surgery.[3] Nevertheless, concerns about an increased risk of regurgitation and pulmonary aspiration have surfaced through several case reports.[4,5] Despite efforts by organizations such as The American Society of Anesthesiologists to provide guidelines,[3] the available evidence remains limited, predominantly relying on anecdotal reports. This systematic review and meta-analysis aimed to assess and quantify the impact of GLP-1R agonists on gastric emptying in the adult population.

METHODS

Electronic databases were searched for relevant articles from inception to 13 July 2023, for randomized controlled trials and prospective cohort studies that evaluate the impact of taking any approved GLP-1R agonist on gastric emptying half time (T½). Acceptable GLP-1R agonists included both short-agenting agents such as exenatide, dulaglutide, and lixisenatide, as well as long-acting agents such as liraglutide and semaglutide. There were no restrictions placed on the indication for GLP-1R use. Only studies that included a placebo group or baseline values for comparison were included. Studies that included patients with gastroparesis, or that did not specify the exclusion of diabetic patients with gastroparesis were excluded. Screening and extraction of identified articles was carried out independently by two reviewers. Standardized mean difference was calculated to compare pre-post T½, and meta-analysis was performed. Three-level meta-analysis was used for studies that provided two sets of results for different dosages or durations. Cumulative meta-analysis was conducted to check the effect of each

study on heterogeneity followed by the recalculation of heterogeneity. We further completed the Egger's asymmetry test. The results were presented in the form of forest plots.

RESULTS

Thirty-four gastric emptying studies were identified. Of these, nine studies comprising 445 patients provided data on T½ and were included for quantitative synthesis. Liraglutide was the most studied (*n* = 5), followed by lixisenatide (*n* = 3). Semaglutide and exenatide were each used in one study. Gastric emptying was assessed with the ^{13}C-Octanoic breath test (*n* = 5), scintigraphy (*n* = 3), and paracetamol absorption (*n* = 1). The indication for use was most commonly for treatment of T2DM (*n* = 5), followed by obesity (*n* = 3) and type 1 diabetes (*n* = 1). Three studies had a study duration of less than seven days, while the remaining studies ranged from 21 to 168 days. All studies reported a significant delay in gastric emptying in patients treated with GLP-1R-agonists compared to baseline or placebo. Meta-analysis showed that the use of a GLP-1R-agonist was associated with over a two-fold increase in T½ (SMD = 2.38; 95% CI, 1.05 to 3.71; I^2, 97.7%; P ≤ 0.001).

DISCUSSION

This study shows that the use of a GLP-1R agonist may result in significant delays to gastric emptying half time when used either for obesity or T2DM. This prolongation is preserved even with long-term use up to 168 days. We found a high level of heterogeneity in the literature that quantify the impact of GLP-1R agonist use on gastric emptying because of variable outcomes being reported. Further work is needed to assess the impact of these findings on preoperative fasting guidelines and clinical practice.

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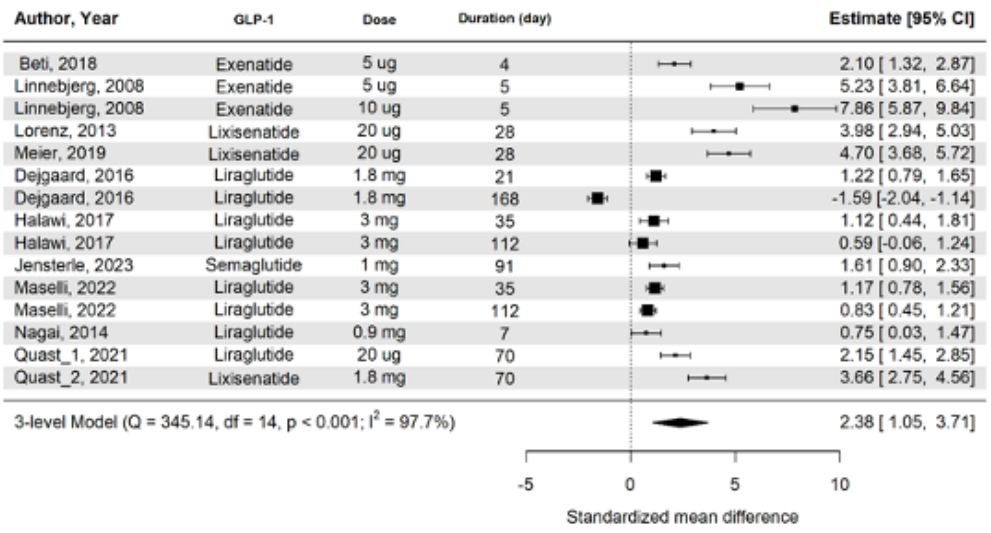
Figure Forest plot of GLP-1R agonist use and gastric emptying half-time



The impact of near-infrared spectroscopy-based intraoperative management on neurocognitive outcomes in adults undergoing cardiac surgery: a systematic review and meta-analysis

Submission ID

25

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INTRODUCTION

Adverse neurocognitive outcomes are common after adult cardiac surgery, with postoperative cognitive decline (POCD) ranging from 30–80% at discharge. Based on the premise that adverse neurologic outcomes are caused by focal or global cerebral hypoxia, near-infrared spectroscopy (NIRS) guided anesthetic delivery may be used to prevent adverse postoperative neurologic outcomes. We undertook a systematic review and meta-analysis of RCTs to describe the effect of NIRS-guided intraoperative management on postoperative neurocognitive outcomes and mortality in adults undergoing cardiac surgery on cardiopulmonary bypass.

METHODS

We searched CENTRAL, CINAHL, EMBASE, MEDLINE, PsycInfo, and Web of Science from inception until 31 October 2023 for randomized controlled trials (RCTs) evaluating the effect of NIRS-guided intraoperative management *vs* standard care (no NIRS or blinded NIRS monitoring) in adults undergoing cardiac surgery on cardiopulmonary bypass. Pairs of reviewers screened titles and abstracts and full texts, and independently extracted data which were combined using a random-effects model. We evaluated the outcomes of POCD, delirium, stroke, and mortality. We assessed the risk of bias of included trials using a modified version of the Cochrane Risk of Bias tool, and evaluated the overall quality of evidence for each outcome using the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach.

RESULTS

We included 16 RCTs (*n* = 2,560); 6/16 were judged to be at high risk of bias, primarily because of inadequate reporting. NIRS-guided intraoperative management decreased the incidence of

short-term adverse neurocognitive outcomes, including POCD (*n* = 796; risk ratio [RR], 0.65; 95% confidence interval [CI], 0.42 to 0.99; I2 = 64.9%; very low-quality evidence) and delirium (*n* = 1,197; RR, 0.74; 95% CI, 0.57 to 0.98; I2 = 7.9%; low quality evidence). NIRS guided management also lead to a higher mean MMSE score in the early postoperative period (*n* = 301; mean difference [MD], 1.72; 95% CI, −0.02 to 3.46; I2 = 89.6%; very low-quality evidence) and from 6–12 weeks postoperatively (*n* = 222; MD, 0.14; 95% CI, −1.54 to 1.83; I2 = 83.9%; very low-quality evidence). NIRS guided management did not reduce the risk of stroke (*n* = 1,657; RR, 0.89; 95% CI, 0.42 to 1.91; I2 = 6.0%; low quality evidence) or mortality (*n* = 1,438; RR, 0.84; 95% CI, 0.47 to 1.52; I2 = 0.0%; low-quality evidence).

DISCUSSION

We identified low to very-low quality evidence that NIRS guided intraoperative management reduces the risk of short-term postoperative cognitive decline and delirium, but does not decrease the risk of stroke or mortality. More rigorous evidence is required to clarify the role of NIRS-guided intraoperative management for preventing adverse neurocognitive outcomes in adults undergoing cardiac surgery on cardiopulmonary bypass.

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No references.

The impact of perioperative complications on employment and earnings after elective hip or knee replacement surgery: a population-based cohort study

Submission ID

29

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INTRODUCTION

After successful joint replacement surgery, patients are better able to participate in the workforce.[1] Nevertheless, complications such as adverse cardiac events, organ failure, re-operation, or unexpected re-admission to hospital can steer patients away from a typical recovery and potentially impact their ability to return to work and earn an income.[2] In this study we aimed to quantify the negative impact of perioperative complications on employment status and earnings after elective hip or knee replacement surgery.

METHODS

We conducted a population-based cohort study using data from the Canadian Hospitalization and Taxation Database from 2004–2019.[3] Our Research Ethics Board waived the need for ethics approval as these data are publicly available. We included adults aged 30–63 yr having an index elective hip or knee arthroplasty who had filed tax returns every year from the year before surgery through to two years after surgery. Our primary exposure was a perioperative complication, defined as a composite of adverse medical events or rehospitalization within 30 days. Our coprimary outcomes were employment in the second year after surgery and the difference in earnings from the year before surgery to the second year after surgery. Patients with complications were matched 1:1 to those without complications using propensity scores, with exact matching on the month and fiscal year of surgery, type of surgery, and presurgery employment status. The propensity score model also included baseline characteristics related to demographics, comorbidity, and family finances. We used a probit regression model to assess the marginal effect of perioperative complications on employment after surgery and a

difference-in-difference ordinary least squares regression model to assess the marginal effect on change in earnings from before to after surgery.

RESULTS

We captured 207,885 working-aged adults undergoing an index elective hip or knee replacement surgery (age 56.2 ± 6.0 yr; 56.0% female; 40.4% hip; 59.6% knee). Perioperative complications were experienced by 12,655 (6.1%) of the sample. After matching, 22,568 patients (11,284 pairs) were included in primary analyses. In the second fiscal year after surgery, 58.7% of patients with complications were working compared to 60.9% of patients without complications (−2.2 percentage points [pp]; 95% CI, −3.5 pp to −1.0 pp). Patients with complications had an average $1,672 greater decline in annual earnings from before surgery (95% CI, −$2,895 to −449), compared to patients without complications.

DISCUSSION

Perioperative complications resulted in a lower likelihood of employment and lower earnings for working-aged adults having elective hip or knee replacement surgery. In addition to their detrimental impact on patients and their families, perioperative complications may also have broader economic implications related to increased health care use, reduced workforce productivity, and lost taxation revenue. Our findings may inform future decisions about health care resource allocation and evaluations of perioperative care.

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Virtual multidisciplinary preoperative assessments: a multisite formative evaluation and evidence-based guide for implementing change

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INTRODUCTION

Virtual care is not new to medical systems, yet the adoption of this innovation has been slow in certain clinical encounters. Multidisciplinary preoperative assessments are well-suited to virtual care.[1] Implementation science can be described as striving to understand what, why, and how interventions work in “real world” settings.[2] Implementation science frameworks are used to guide implementation design, evaluation, and sustainability plans.[2] The use of these frameworks can improve adoption and integration of evidence-based interventions within health care systems.[2] We applied established implementation science methodology to the development of a virtual preoperative assessment pathway. The purpose of this study was to increase patients’ access to high-quality virtual care and identify strategies to aid in the deployment of virtual preoperative clinics.

METHODS

This study was approved by our institution’s Research Ethics Board. We conducted a two-phase formative evaluation to develop a virtual multidisciplinary preoperative assessment pathway. In phase 1, using the Promoting Action on Research Implementation in Health Services (PARIHS) implementation framework[3] we conducted key stakeholder semi-structured interviews to identify and understand factors influencing the development and adoption of virtual multidisciplinary preoperative assessments. Purposive and snowball sampling were used to interview stakeholders including patients and their caregivers, physicians, registered nurses, allied health care professionals, schedulers, and information technologists. Each audio recorded interview was conducted by a research coordinator via video or phone call and subsequently transcribed. Transcripts were coded using deductive thematic analysis to examine the ways that stakeholders described their experiences within the three major elements of the PARIHS

framework (Evidence, Context, Facilitation) and further organized within the elements by themes and subthemes. Coding was supported by qualitative data analysis software (Nvivo 12, QSR International). In phase 2, evidence-based strategies from the Expert Recommendations for Implementing Change (ERIC)[4] project were matched to all identified subthemes from the formative evaluation and rank ordered based on stakeholder scoring of both importance and feasibility using Go-Zone analysis.[5]

RESULTS

Forty participants were interviewed, including 12 patients or family members, 18 health care providers, and 10 administrative decision makers. Eight themes and 49 subthemes were identified to focus the implementation of virtual preoperative assessment. Three themes aligned predominantly with Evidence: 1) patient benefits of virtual care, 2) patient concerns about virtual preoperative assessment, and 3) relative advantage of virtual preoperative assessment. Four themes aligned predominantly with Context: 4) virtual care resources, 5) external supports, 6) health care provider culture, training, and needs, and 7) workflow and process. One theme aligned with Facilitation: 8) facilitators of virtual preoperative assessment. Subthemes were matched to expert recommendations and twelve strategies were judged to be most important and feasible by a panel of stakeholders in preoperative assessment (Table).

DISCUSSION

Using established methodology, we identified twelve feasible strategies for implementing virtual multidisciplinary preoperative assessments. These strategies are likely transferrable to other institutions considering implementation of virtual preoperative care with adaptation to the local context. We have developed a local virtual care process for multidisciplinary preoperative assessments based on these findings and evaluation of both implementation and clinical outputs of the pathway are ongoing. Our data suggest a virtual multidisciplinary preoperative assessment pathway is feasible, may improve clinical efficiency, and could reduce the burden of travel and related costs for patients, especially for those in rural and remote areas.

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Table Strategies for implementing virtual multidisciplinary preoperative assessments

Strategy	Description[4]
Build a coalition	Recruit and cultivate relationships with partners in the implementation effort.
Conduct local consensus discussions	Include local providers and other stakeholders in discussions that address whether the chosen problem is important and whether the clinical innovation to address it is appropriate.
Develop a formal implementation blueprint	Develop a formal implementation blueprint that includes all goals and strategies. The blueprint should include: 1) aim/purpose of the implementation; 2) scope of the change (e.g., what organizational units are affected); 3) timeframe and milestones; and 4) appropriate performance/progress measures. Use and update this plan to guide the implementation effort over time.
Develop educational materials	Develop and format manuals, toolkits, and other supporting materials in ways that make it easier for stakeholders to learn about the innovation and for clinicians to learn how to deliver the clinical innovation.
Distribute educational materials	Distribute educational materials (including guidelines, manuals, and toolkits) in person, by mail, and/or electronically.
Identify and prepare champions	Identify and prepare individuals who dedicate themselves to supporting, marketing, and driving through an implementation, overcoming indifference or resistance that the intervention may provoke in an organization.
Identify early adopters	Identify early adopters at the local site to learn from their experiences with the practice innovation.
Involve patients and family members	Engage or include patients/consumers and families in the implementation effort.
Prepare patients/consumers to be active participants	Prepare patients/consumers to be active in their care, to ask questions, and specifically to inquire about care guidelines, the evidence behind clinical decisions, or about available evidence-supported treatments.
Purposefully re-examine the implementation	Monitor progress and adjust clinical practices and implementation strategies to continuously improve the quality of care.
Revise professional roles	Shift and revise roles among professionals who provide care, and redesign job characteristics.
Stage implementation scale up	Phase implementation efforts by starting with small pilots or demonstration projects and gradually moving to a system wide rollout.